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Samuel G. Dixon, M. D., LL. D., Sc. D.
COMMISSIONER.

INFANTILE PARALYSIS

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INFANTILE PARALYSIS.*

With the full appreciation of the force of Lord Bacon's accusation that "A man good at excuses was usually good for nothing else," I ask you to excuse me for not whipping my words into better shape. The excuse is that in these revolutionary times, those holding public offices are overwhelmed by questionnaires from innumerable commissions, committees, associations and societies.

The subject "Poliomyelitis" is one upon which much work has been done and much has been said, yet there is still a dearth of exact knowledge. My only excuse for being here tonight is to refresh your memories as to what has been told you before about the part taken by Pennsylvania's State Department of Health and what she recommends, both for general and police practice, in the battle against a number of sporadic cases, or possibly against epidemic conditions which may arise this summer.

The history of epidemics of poliomyelitis does not point to a recurrence of an epidemic or a large number of sporadic cases this season, unless perchance it should come from one of the epidemics previous to that of last year. Last year's epidemic seemed to come from New York City. If so, it was not indigenous with us. The history of poliomyelitis, as I have said, would indicate that it, like much other organic life, comes in waves. For instance, if we have a good apple season this year, the crop next year is not likely to be as full. These waves are noticeable in insect life. The lower forms of life, such as fungi, are almost sure to run in waves from year to year. However, as these generalizations are exceedingly uncertain, we must be prepared for an attack this summer.

*Address by Samuel G. Dixon, M. D., LL. D., Sc. D., upon Poliomyelitis before the Philadelphia Pediatric Society at the Academy of Natural Sciences, June 12, 1917.

In 1907, the Department encountered the first epidemic of Infantile Paralysis in Pennsylvania. It began in midsummer and gradually increased until November, after which month only a few cases appeared here and there throughout the State. An interesting clinical account of this epidemic is to be found in the Annual Report of the Department of Health for 1907 (pages 420 to 440). Dr. Herbert Fox and Dr. J. B. Rucker did the field and Laboratory work. They made a very thorough investigation, including statistics in relation to environment, insect and fungus life, as well as geological formations. This article is particularly interesting because it cites the fact that "A Gram positive diplo or tetra-coccus was recovered when the spinal fluid was poured into glucose bouillion and incubated. This Gram positive diplo or tetra-coccus was found in all the cultures from the nose and throat. None of these cultures produced any pathogenic manifestations in experimental animals which could be compared to poliomyelitis; indeed they seemed devoid of pathogenicity. The spinal fluid of two of the cases was injected into the spinal canal of a monkey without result. The monkey's nose and throat were inoculated with the Gram positive coccus, likewise without results." In this report we admitted that we might not know how to handle these organisms, but, as time has gone on and as other work has been done, we are not willing to change our views as to our negative results, while we are anxiously watching our fellow-workers, who seem sanguine of the positive action of similar organisms since isolated by them.

The history of poliomyelitis dates back to 1838 and extends from Norway to northern Alaska and to the most southern states of our Union. For a fuller history I refer you to my address to the Philadelphia County Medical Society in 1916, published in the Journal of the American Medical Association, January 18th, 1917. The disease was not reportable in 1907. We depended upon the grace of the medical profession and to our newspaper clipping bureaus for knowledge of the cases. In this, our first work, the various stages of severity occurring in epidemic poliomyelitis, varied from the abortive type to a rapid form like Landry's paralysis, combined with symptoms and signs of meningeal irritation. It was our suspicion at that time that simple contact did not always explain the transmission. The clinical and pathological findings have stood the criticism of time while a number of our tentative conclusions of 1907 are still unsettled. In that year we had 131 reported cases. It cannot be known how many were unreported. Seven counties (Elk, Forest, Jefferson, Clarion, Venango, Warren and Lawrence) shared in the outbreak. In 1908 a similar outbreak visited Adams County. Map study of these cases and later ones suggest that the disease is quite as likely

to appear in a new centre as to reappear in a centre recently infected. During 1908 Pennsylvania suffered slightly from poliomyelitis. On account of the presence of the disease elsewhere, I called together the Advisory Board of the State Department of Health, and after conference it was decided to promulgate a regulation placing poliomyelitis among the reportable diseases of Pennsylvania; therefore our comprehensive morbidity and mortality records date back to and include 1910. In this year, after a few cases reported in July, an epidemic of some proportions spread rapidly. In the month of August we had 275 cases; September 378 cases; October 197 cases; November 25 cases; December 15 cases. The prevalence of the disease began to abate in October and continued through the fall months, practically disappearing with the coming of winter. Total number of cases reported during the final six months of 1910 was 1,112. The total number of deaths was 269. For this fateful year for Pennsylvania we looked forward to 1911 with considerable anxiety, yet 177 cases only occurred in that calendar year. In 1912, there were 267 cases; in 1913 there were 141 cases; in 1914, 113 cases; and in 1915, 162 cases showing a definite decline followed by a slight rise covering the four years preceeding 1916. During these four years, the cases were scattered over the State, but not in uniform manner, as whole counties escaped entirely. In certain instances, isolated mountain homes were visited by the disease, making it difficult to explain the cases by theories of either human or insect carriers. In 1914, in the southwestern section of Washington County there occurred 32 cases, while in 1915 the concentration was in the northwestern corner of the State, in and about the City of Erie, where about 100 cases developed.

We now come to the year 1916, during the first six months of which year there occurred but 22 cases in our State, covering an area of 45,000 square miles. As the summer approached, however, a severe outbreak of the disease, an outbreak previously unequalled in number of cases, occurred in the city of New York, rapidly extending into New Jersey and other States. Accompanying this sudden extension and the high death rate, there arose in the public mind a condition of hysteria. My 'phone rang both day and night for sixty days, for advice as to what was best to be done with the children.

This raised the question in the minds of public health officers "How to treat the psychological condition, in addition to our work started to prevent the spread of the disease." We were unfortunately up against it, not knowing how nature spreads the infection. Many cases would seem to have come from personal contact with those infected, while others would fall to its attack without apparently being exposed to one infected. There was much evidence of direct

infection, such as we have in communicable disease caused by microscopic life, yet the possibility of the presence of an independent or intermediate host or carrier could not be gainsaid.

To care for the mental condition of the public, the possibility of direct contact infection and the possibility of some foreign carrier or host that might be the intermediate cause of the disease, the State Advisory Board adopted three weeks quarantine for the sick. The City of Philadelphia followed New York City and made quarantine four weeks, so that we extended our period to thirty days, to come nearer our own great city. We never believed it necessary to adopt a longer period and must come back this year to our original three weeks detention.

The State wide quarantine, covering a boundary line of 900 miles, satisfied our people that their children were going to be cared for regardless of the expenditures of energy and money. This was quite an undertaking. However, our Department was organized to take charge of epidemics and catastrophes. The mobilization was quickly accomplished and in two days a little army of men was ready for duty. Railroad stations, ferry and steam boat landings, public highways, motor and row boats, bridges and automobiles were guarded by our police. The order had been advertised and on a Monday at midnight our officers were on guard. All children under sixteen years of age had to have certificates of health and non-exposure to others suffering with the disease. These certificates were issued by the health authorities of their home districts.

All railroad coaches and freight cars, carrying second-hand furniture, were disinfected. These measures kept thousands of sick and infected children from our midst. At the same time, the cleansing of transportation vehicles may have kept out carriers or hosts of the unknown cause.

There was more trouble with the educators, on account of closing the schools, than any persons we had to deal with through the quarantine period. Educators, as a rule, object to closing of the schools no matter what threatens the lives of children.

The result was that in Philadelphia we escaped with an approximate incidence of one case per 15,000 population, against New York's incidence of 27 cases per 15,000 population. In the same connection it is interesting to note that the rate of incidence in Newark, New Jersey, was 49.5 cases per 15,000 population, *fifty times* greater than Philadelphia.

The termini of our great railroads from disease districts became the infected centers in Pennsylvania; as for example, Philadelphia with its direct lines, the Pennsylvania and Reading railroads. Before quarantine we caught infected and sick children coming into

Pennsylvania from New York. Wilkes-Barre and Scranton together represent another great terminus of New York trains and there we got the next biggest bunch of cases. The railroads seemed to continue to carry the cause of the disease, after the children were cut off; therefore, we quarantined second-hand furniture, etc., and recommended our people not to go through infected districts in other states, as we only recognized the infected environments.

Without theorizing as to the unknown cause, under the circumstances it was enough to know that the disease existed in a place, for us to advise the public to steer clear of the environment. Pennsylvania, including her greater cities, quarantined the cases in the strictest manner, fearing the contact infection theory as a possibility, while New York, in some of her infected districts, placarded without real quarantine. She did, however, do everything in her power to carry her cases to the hospital, where, of course, good quarantine must have been enforced.

The different features of this disease are so interlocked that I might as well enlarge here upon communicability by giving a few facts in the Pennsylvania epidemic in 1910. We only recognized a small percentage of second cases in families with two or more children. In the children's institutions where infected children were admitted and came in contact with healthy children, we had few, if any, second cases. This was also true to some degree in hospitals. In our laboratory we exposed a large number of perfectly healthy monkeys to sick monkeys in all stages of poliomyelitis. In some cases we smeared the nasal mucus of those sick upon the nasal mucous membrane of the healthy animals. These monkeys lived in the closest contact with each other night and day. They ate together, fought and played together, but never succeeded in transmitting the disease from the sick to the well.

These facts stimulate us to continue a broad hunt for the enemy. We recognize that it is claimed that those persons who have not become immune by having the disease will become infected when exposed, but possibly so slightly as not to be recognized under ordinary circumstances. This is not satisfying when we consider that among thousands of children in institutions, a hundred per cent. either resist the disease entirely or to such an extent that they never appear to be sick. Right here we may ask ourselves "Why the enormous difference in resistance to the disease in children's institutions and in private homes?" Here the question of food lines attracts attention. In the institutions a much greater proportion of the foodstuff served is cooked. In the private homes of children, the diet is not only of a greater variety but includes raw vegetables and fruit. If it were not for the breast fed babies, this difference in susceptibility

to the disease when food is cooked versus raw food would be well worth receiving considerable attention in our handling of epidemics. The milk fed infant does not entirely discount the suggestion of cooked foods versus raw foods, for the reason that a large proportion of breast and bottle fed babies often get a variety of foods from the mother's or nurse's fingers.

Our laboratory work has been continuously pursued for years without the discovery of the cause of poliomyelitis. The experiments that have been without result are too numerous to mention. They are, however, out of our way and the field of research therefore has been somewhat reduced. Today we are working along several lines of immunity against the disease and against paralysis. The pursuit of laboratory investigations is of the highest importance. The search for that which produces poliomyelitis in man is of the highest scientific interest. We, however, as health officers, are spending more energy in search of that which will prevent the disease or for an antitoxin to prevent the paralysis.

High stakes at Monte Carlo cannot interest or excite the gambler as does original research work interest the laboratory worker, when it is directed to recover a product to save the lives of our people from disease produced by single celled organisms or other low forms of life. So interested do we become in following out the theories evolved by facts and the scientific imagination that the dangers surrounding the work are not as a rule thought of, any more than the soldier thinks of his own life when in the heat of battle. The soldier, however, dies a heroic death while the bacteriologist fights his fight against deadly disease-producing germs and is rarely heard of by the public.

During our years of research work on poliomyelitis, we have on several occasions, owing to coincidence, enjoyed the thought that our task had been accomplished; only to end in disappointment. Today, we are in the midst of most interesting work. It is too early, however, to count on success. We therefore have nothing to say to the profession or the public that would give them false hopes. Too often the innocent laboratory worker has spoken of promising work and has been misunderstood and quoted as having made a great discovery. Just to give you a little insight to our work I will give you a superficial glance at a portion of one of our present undertakings. We are not altogether alone in this experiment. This is often the case as we approach a goal. At times two workers cross the line together or tumble, arm in arm, headlong into the pit of disappointment. About a year ago we worked out a theory to produce a substance that might bear upon the modification of the disease commonly known as Infantile Paralysis. The first move required a virus, made from

the human spinal cord of a patient dead with the disease. Then a monkey, the most susceptible of the lower animals to this disease, was injected with the virus. This was accomplished without difficulty. Then came the task of injecting small rabbits with the spinal cord of the monkey. The line of work was begun on rabbit No. 1, this animal having been inoculated intraperitoneally with a saline emulsion of a portion of the spinal cord of the monkey. This produced what we called poliomyelitis in rabbits, ending in death. This rabbit's spinal cord was treated and rabbit No. 2 was inoculated and carefully observed by those versed in the clinical and pathological evidences of the disease. No marked differences were noted in No. 2 from conditions produced in No. 1. This work was continued under scientific manipulation and observation until we finished with the tenth rabbit. Then, believing we had a modified condition, we reversed our work, gradually running down the line of rabbits, each time using a stronger virus. When we reached No. 4 we returned it to a monkey with a modified result. This is only given to you that you may have some better realization of our methods adopted in our work in search for something to overcome this miserable disease which has attacked the human race. At present we are also working along the lines of other theories. You must understand that we do not know what produces the disease and we have not as yet a satisfactory result in our research work for prevention or cure.

THE DIAGNOSIS must be dependent upon keen diagnostic skill. Independent of individual clinical symptoms and even when coupled with a microscopic examination of the spinal fluid, the medical profession recognizes the importance of the general feeling which the picture of the condition of the patient presents to him. We have all heard of critics of art who say, after admiring a picture, "It has good atmosphere with good drawing and effective grouping, but the picture on the whole is bad." The lay person has no conception of the different degrees of variation in which diseases present themselves, variations far removed from the classical cases which the medical teachers depend upon in teaching their students. In fact the variations are so numerous that they can only be studied in practice or in extended hospital experience.

In poliomyelitis it is important to make an early diagnosis. In an epidemic it is better to give every uncertain case the benefit of the doubt. My advice, therefore, is to watch our children closely during the present season and upon the least indisposition to call in your physician. The poor will always find in the profession philanthropists. This disease, like many others, has a variety of ways of presenting itself. This is all I mean to say on diagnosis, as I am

speaking to members of the Pediatric Society. Those present are constantly at the bedsides of children and are much better prepared to discuss the question of diagnosis than I am, one pulled here and there from emergency work to the requirements of special laboratory work. So far as our lay friends present are concerned, it would be a mistake for me to undertake to teach them, off hand, even what I could, as a little knowledge is a dangerous thing. It makes me shudder to see people undertake to diagnose their own cases and then begin to dose themselves with active drugs. Such practice has shortened the lives of many of our friends. As I have said, my modesty and want of a keen, fresh knowledge of the requirements of the clinical side of poliomyelitis will not permit me to enlarge on this branch of the subject. There are many present quite capable of discussing this in its latest phases.

Treatment is even today largely empirical and therefore must be left to the physician. Therefore, this phase must be spoken of by someone who is devoting his life to bedside practice. I hope some laboratory man will some day in the near future place in the hands of the therapist an exact cure or something that will immunize.

A few words on public hygiene in relation to poliomyelitis: Environment has been reviewed by the State Health Department. It is a most complex question. This you will realize when you consider the possibilities still hanging over the cause of this disease. The geological formations, some with dry and some with wet soils, the variations in topography, some sea level regions and some snow topped mountains, are to be considered. The untold variety of insect life; a visit to the entomological section of this Academy will demonstrate millions of varieties; Plant life might perchance be a factor, yet its species are so vast and the geographical range is so spread by artificial methods of transportation, that one simply looks at this task with awe. Even reptile life has been thought of by some of us who have imaginations. When it comes to civil life I am inclined to the opinion that environment has a bearing on the life of the disease.

During the late epidemic of poliomyelitis the disease showed an angry condition at Bristol in Bucks County, Confluence in Somerset County and Old Forge in Lackawanna County. All of these boroughs were small and therefore loaned themselves to a very thorough cleaning up. This was accomplished to a great extent in Bristol and Old Forge and in these two municipalities the cleaning up, inside and outside the houses, and an attempt to educate the inhabitants, seemed to bring a result, as the disease soon quieted down.

The Department, in cooperation with our strong and efficient local health boards, has decided to insist on general cleanliness. Every

house should be immaculately clean, free from insect life, flies of all kinds, mosquitoes, cockroaches, fleas, lice, etc. All foods should be kept clean and free from mould. In fact, with what I have said about the freedom of children living in institutions and the habit of feeding more cooked food there than in private life, I would personally recommend the cooking of all foods for children. If uncooked fruit or vegetable matter is at all connected with the disease the chances are that the cause is carried on the outside of the food. Don't forget, however, what I have said about the breast and bottle fed babies having the disease. It is only our want of knowledge that makes us so comprehensive in our precautions. We all discourage the congregating of children and recommend keeping them in the best of health, cleanly, regularly fed, giving those with teeth a little meat, fat and white or whole wheat bread, rice, macaroni, potatoes or other starchy foods, but all in moderation. Babies and small children should not be chilled at night; they should not bathe until they are blue or cold; they should not exhaust themselves at play or work.

If animals are to be kept in the house they should be kept free of insect life. The homes should be screened against insect life. If not thoroughly screened they become fly traps. Just here I will mention one interesting fly we ran to ground, the appendigaster. This fly enters dwellings, goes to the floor and seeks the cockroaches' nest. In it she lays her eggs. These hatch a little later than the cockroaches and they live off the larvae of the cockroach. Just here I will mention another line of work that was done. Certain wasps inject a fluid into their prey to paralyze them. Therefore we used this fluid to determine its effect upon small animals. The result was negative.

Homes should be well aired and sunned. Adults who travel about should brush their clothes before mingling with their children. Grounds around dwellings should be kept clean; no manure should be kept exposed to insects or breeding places. Rain barrels, tin cans and bottles should not be left around for mosquitoes to breed in. Small pools should be drained or filled up to prevent the breeding of mosquitoes and all other insects. Dead weeds and tops of vegetables should be raked up and destroyed. Traps in drains often furnish great breeding places for mosquitoes in country places.

The quarantine for cases this year will, I believe, be three weeks. The massing of children will be forbidden if the disease appears in a threatening way. General quarantine will depend entirely upon the progress of the disease.

Before closing my remarks I want to again refer to the advisability of sending for a physician when your child gets sick. In the early stage he is much needed. The child needs absolute quiet and all the rest possible. If any deformity comes from the attack you want the

orthopedist. I bring this subject up especially to warn the anxious parent, heart broken over the deformity of the child, against resorting to charlatans who promise impossibilities. Don't permit manipulation, electricity and massage unless under the advice of a physician of high standing. Otherwise the child's sole chance of recovery is swept away by vicious treatment at the hands of these extortionate and conscienceless parasites of society.

PENNSYLVANIA HEALTH BULLETINS.

1. July, 1909. The Disease-Breeding Power of House-flies; Method of Prevention.
2. Aug., 1909. Note on the Similarity of Barium Carbonate Poisoning and Rabies in Dogs.
3. Sept., 1909. The Family Physician.
4. Oct., 1909. Legal Rights and Tuberculosis. The Public Drinking Cup.
5. Nov., 1909. The Germicidal Effect of Water from Coal Mines and Tannery Wheels upon *Bacillus Typhosus*, *Bacillus Coli*, and *Bacillus Anthracis*.
6. Dec., 1909. Report on the Effect of Repeated Injections of Products of the Tubercle Bacillus on Lymphatic Organs.
7. Jan., 1910. Little Dangers to be Avoided in the Daily Fight Against Tuberculosis.
8. Feb., 1910. The Object to be Attained by the Medical Inspection of School Children.
9. March, 1910. Conservation of Human Life in Pennsylvania. The Results of Four Years' Work of the Department.
10. April, 1910. The Biological Treatment of Tuberculosis as Conducted by the Department.
11. May, 1910. The Bubonic Plague, its Origin, Progress, and Means of Prevention.
12. June, 1910. A Retrospective Glance. 1. Susceptibility to Tuberculosis. 2. Purity of Milk. 3. Bovine Tuberculosis.
13. July, 1910. Experiments on Tubercle Bacilli, Old Tuberculin, and the Fluid of Dixon.
14. Aug., 1910. The Conservation of Child Life in Pennsylvania.
15. Sept., 1910. Obedience to Nature's Laws the Primary Defence against Disease.
16. Oct., 1910. The Conservation of Infant Life in Pennsylvania.
17. Nov., 1910. Pennsylvania's Standing Army of Health.
18. Dec., 1910. Producers and Consumers. Pennsylvania's Tuberculosis Schools.
19. Jan., 1911. The Effect of Injections of Taurin upon Tumors of Mice and Dogs.
20. Feb., 1911. Some Duties, Ideals, and Opportunities of the Country Doctor.
21. March, 1911. Malaria: How it is Caused, and How to Get Rid of it.
22. April, 1911. Health.
23. May, 1911. The Common Fly. How it Develops. Why it must be Destroyed, and How to Destroy it.
24. June, 1911. Effects of Products of Tubercle Bacilli on Epithelium.
25. July, 1911. Five Years of Tuberculosis in Pennsylvania.
26. Aug., 1911. Organization of the Pennsylvania State Department of Health.
27. Sept., 1911. Tuberculosis, in the Country as well as in the City, a Disease of Bad Housing and Lack of Nourishing Food.
28. Oct., 1911. The Preparation of the Biological Products Distributed by the Pennsylvania Department of Health.
29. Nov., 1911. The Foundations of State Medicine.
30. Dec., 1911. Experiments Tending to show the Infrequency of the Occurrence of Tubercle Bacilli in the Urine of Patients Suffering from Pulmonary Tuberculosis.
31. Jan., 1912. The Baby the Most Important Problem in Modern Life.
32. Feb., 1912. Insects. The Common Forms in Relation to Public Health, and Methods for their Destruction.
33. March, 1912. The Opportunities for the Trained Nurse in Sanitary Service.
34. April, 1912. How to Organize a Baby-Saving Show.
35. May, 1912. Drowning.
36. June, 1912. The Health of Suburban Residences.
37. July, 1912. Report of the Austin Disaster.
38. Aug., 1912. Getting Close to the People. Caring for the School Children.
39. Sept., 1912. Modern Medicine and the Physician.
40. Oct., 1912. Battling for Health at Mount Alto.
41. Nov., 1912. Tuberculin.
42. Dec., 1912. Conservation of Health. An Address.
43. Jan., 1913. Municipal Sanitation.
44. Feb., 1913. Tuberculosis and Our Schools.
45. March, 1913. The Relation of the Undertaken to the Public Health.
46. April, 1913. What State Control over Streams has done in Pennsylvania in Seven Years.
47. May, 1913. Troy Typhoid Fever Epidemic.
48. June, 1913. The Registration of Vital Statistics a Social Service.
49. July, 1913. Pennsylvania's Eugenic Marriage Law.
50. Aug., 1913. Pennsylvania's Health Legislation of 1913.
51. Sept., 1913. Health and Education. An Address.
52. Oct., 1913. Relation of Public Health to Industrial Welfare. An Address.
53. Nov., 1913. Bathing.
54. Dec., 1913. Results from the Injection of the Wax of the Tubercle Bacillus Indicating its Influence on Immunity and Susceptibility to the Tubercle Bacillus.
55. Jan., 1914. The Waters of Pennsylvania. An Address.
56. Feb., 1914. Reproduction and Race Betterment.
57. March, 1914. The State Tuberculosis Dispensary as a Social Service in Pennsylvania.
58. Rev. Apr. 1914. The Preparation of the Biological Products Distributed by the Pennsylvania Department of Health.
59. May, 1914. Insanitary Bath Tubs and Lavatories.
60. June, 1914. On Housing.
61. July, 1914. Medical and Sanitary Inspection of Schools of Fourth Class Districts in Pennsylvania.
62. Aug., 1914. Progress in Preventive Medicine in Pennsylvania since the Creation of a State Department of Health.
63. Sept., 1914. Certain Standards for Tuberculosis Dispensaries.
64. Oct., 1914. On the Upfallow of Sanatorium Patients.
65. Nov., 1914. Effective Rural Sanitation. End Results.
66. Dec., 1914. Pennsylvania's System of Tuberculosis Dispensaries.
67. Jan., 1915. Present organization of the State Department of Health.
68. Feb., 1915. Notes on Typhoid Fever in Pennsylvania for the Past Nine Years.
69. March, 1915. Epidemic of Typhoid Fever in Skippackville and Vicinity.
70. April, 1915. Diphtheria and Diphtheria Antitoxin.
71. May, 1915. Flies as a Factor in Infant Mortality.
72. June, 1915. Pennsylvania Health Legislation of 1915.
73. July, 1915. On the Medical Inspection of 469,000 School Children in Pennsylvania.
74. Aug., 1915. The Sanitary Engineer in Public Health Work.
75. Sept., 1915. Quarantine of the Home as Practised by the Department of Health.
76. Oct., 1915. An Address before the Pennsylvania Water Works Association.
77. Nov., 1915. An Address at the Laying of a Corner-Stone in Pittsburgh.
78. Dec., 1915. On the Prevalence of Typhoid Fever in Philadelphia in the Autumn of 1915.

77. Jan., 1916. The Pennsylvania Department of Health Exhibit at the Panama-Pacific International Exposition.
78. Feb., 1916. The Sanitary Index. A Method of Measuring Public Health Work.
79. March, 1916. Proper Housing Means Cleanliness. An Address in the Conference of the Pennsylvania Housing and Town-Planning Association.
80. April, 1916. Pennsylvania and Her Municipalities. An Address before the State Association of Boroughs.
81. May, 1916. The Department of Health Laboratory, and what it has done for the Physicians of the State. Read before the Schuylkill County Medical Society.
82. June, 1916. Fifteen Little Talks on Health and Hygiene.
83. July, 1916. Fifteen Little Talks on Health and Hygiene.
84. Aug., 1916. Fifteen Little Talks on Health and Hygiene.
85. Sept., 1916. Fifteen Little Talks on Health and Hygiene.
86. Oct., 1916. Fifteen Little Talks on Health and Hygiene.
87. Nov., 1916. Fifteen Little Talks on Health and Hygiene.
88. Dec., 1916. Fifteen Little Talks on Health and Hygiene.
89. Jan., 1917. Little Talks on Health and Hygiene.
90. Feb., 1917. Little Talks on Health and Hygiene.
91. March, 1917. Little Talks on Health and Hygiene.
92. April, 1917. Little Talks on Health and Hygiene.
93. May, 1917. Insects.
94. June, 1917. Typhoid and Typhophors.
95. July, 1917. Infantile Paralysis.

NOTE:—Owing to the exhaustion of the supply, Bulletins of the above list bearing the numbers:—7, 9, 10, 33, 39, 49, are no longer available for distribution.



